PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-221842
(43)Date of publication of application : 17.08.1999

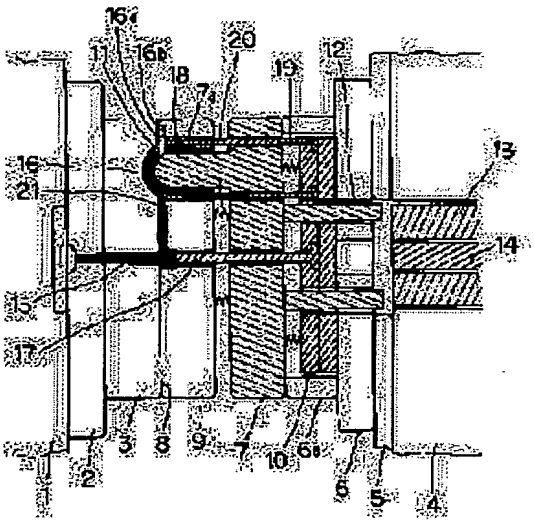
(51)Int.CI. B29C 45/56
B29C 45/26
B29C 45/40
B29C 45/57
// B29L 11:00

(21)Application number : 10-025549
(22)Date of filing : 06.02.1998

(71)Applicant : JAPAN STEEL WORKS LTD:THE
(72)Inventor : ISHIMURA FUMIO
OZAKI TATSUYOSHI

(54) METHOD FOR MOLDING CONCAVE LENS AND ITS MOLDING MOLD

(57)Abstract:
PROBLEM TO BE SOLVED: To produce a concave lens precisely and quickly by a method in which a mold for injection compression molding is filled with a material, and after the concave lenses are molded by compression, the material in an amount corresponding to the contraction due to the difference in thickness between the central and peripheral parts of the lens is supplied to the peripheral part of the molding.
SOLUTION: First, with a core 7a and a pin 18 returned backward, a prescribed amount of a material is packed from a gate 21 into a cavity 11. Next, the core 7a is advanced by a core pushing piston 13, and the excess material is introduced into a tab 16b or returned to the gate 21 to mold a molding shape. Next, the pin 18 and an ejector pin 17 are advanced by a prescribed distance by a rod 14 for an ejector to correct the contraction of the material of the peripheral part 16a of a molding 16. A movable board 4 is retracted to divide a mold at a parting surface 8, and an ejector plate 10 is advanced by the rod 14 to drop the molding 16.



LEGAL STATUS

[Date of request for examination] 30.03.2000
[Date of sending the examiner's decision of rejection] 19.02.2003
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] The shaping approach of the concave lens characterized by amending a contracted part by the thickness difference of the core of this lens, and a periphery by supplying an ingredient to a periphery after filling up with and compressing an ingredient into the metal mold for injection compression molding and fabricating the lens of a concave configuration.
[Claim 2] The shaping approach of the concave lens according to claim 1 characterized by making the die temperature at the time of ingredient restoration below into glass transition temperature.
[Claim 3] Shaping metal mold of the concave lens characterized by forming the ejector pin (17) which is the metal mold for injection compression molding, and discharges mold goods (16) on an ejector plate (10), and two or more pins (18) which press the periphery (16b) of mold goods (16).
[Claim 4] Shaping metal mold of the concave lens according to claim 3 characterized by replacing with said two or more pins (18), and forming the sleeve (22).
[Claim 5] Shaping metal mold of the concave lens according to claim 3 characterized by forming two or more pins (18a) which press two or more tabs (16b) which replaced with two or more pins (18) which press the periphery (16a) of said mold goods (16), and were formed in the periphery of the periphery (16a) of said mold goods (16).
[Claim 6] In the front face of the core plate (7) which is the injection compression mold of a core compression method, and has a core (7a), the spring for core plate return (20), In the front face of an ejector plate (10) which the core push piston (13) acted on the tooth back, and was prepared behind said core plate (7), the spring for ejector plate return (19), Shaping metal mold of the concave lens according to claim 3, 4, or 5 characterized by the rod for ejectors (14) acting on a tooth back.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the shaping approach of a concave lens, and its shaping metal mold, and relates to the injection-molding approach of the PUSURA tic lens of a concave configuration, and its shaping metal mold in detail.
[0002]
[Description of the Prior Art] In recent years, nearsightedness spectacles, a camera image pick-up system, a VTR camera image pick-up system, etc. are being used broadly, and, as for the plastic lens of a concave configuration, much more improvement in the precision forming technique of a plastic lens is desired in connection with it.
[0003] it be a concave configuration as show in drawing 6 , and when carry out injection molding of the large lens 23 of the thickness difference of the main thickness A of a core, and the KOBA thickness B of a periphery (KOBA section) moreover, the flow of the ingredient injected in the cavity 11 from the gate 21 as showed in drawing 7 will be in the condition which show in drawing 7 (b) from the condition show in drawing 7 (a), and a short shot 25 will tend to generate it in a weld line 24 and a core in the opposite side of the gate 21. Therefore, it is necessary to maintain a die temperature at the temperature which an ingredient does not solidify at the time of restoration.
[0004] Conventionally as an approach of fabricating the lens of a concave configuration with a sufficient precision with injection molding Carry out the temperature up of the metal mold to the temperature which can flow the ingredient filled up, and it is filled up with an ingredient in a cavity and the temperature up of the approach of lowering the die temperature and taking out a product after ingredient solidification and the metal mold is carried out after that more than glass transition temperature. It is filled up with an ingredient in the cavity of metal mold, the ball of a glass metallurgy group closes the gate section, and there is a method of annealing a die temperature over 60 seconds etc. about 1 degree C.
[0005] Moreover, the approach using the injection compression mold according to a core compression method in order to make restoration of the ingredient to a core easy is ******.
[0006] Drawing 8 is drawing showing the injection compression mold by the core compression method for fabricating a convex lens. The fixed bottom place 2 by which shaping metal mold is attached in stationary platen 1 as shown in this drawing, The KYABI plate 3 which while is attached in this fixed bottom place 2, and has the compression insertion 31, The movable bottom plate 6 attached in the movable head 4 through the core compressing cylinder 32, The compression plate 33 which is prepared possible [longitudinal slide movement] in annular section 6a currently formed in this movable bottom plate 6, and has the compression insertion 38 of another side, Attachment and detachment on this compression plate 33 is enabled, and it consists of runner plates 34 which form a parting surface 8 with said KYABI plate 3.
[0007] The return pin 36 which guides the spring 35 for compression plate return prepared between the ejector pin 17 which presses spool 15 and discharges mold goods 16, and the compression plate 33 and the runner plate 34 is attached in the runner plate 34 side of said compression plate 33.
[0008] The core compression piston 37 of the shape of hollow which advances the compression insertion 38 through the compression plate 33 is attached in the center section of said core compressing cylinder 32. Moreover, at the time of die opening, the compression plate 33 is further advanced to a movable head 4 with the ejector rod 14, and the hydrostatic pressure cylinder 39 which discharges mold goods 16 by said compression insertion 38 and ejector pin 17 is attached in it.
[0009]
[Problem(s) to be Solved by the Invention] However, the shaping cycle time becomes long and each approach of making high the die temperature stated by the Prior art has the trouble that productivity is bad.

[0010] Moreover, since the differe[redacted]of contraction of an ingredient occurs [redacted]rding to the thickness difference of a core and a periphery, improvement in precision is difficult for the approach using the metal mold for injection compression molding by the surface sink of a periphery etc. Moreover, in correspondence of the periphery by dwelling, it becomes the pressurization from the gate and deformation is caused to the quick core of solidification.
[0011] So, let it be a technical problem to offer the shaping approach of a concave lens that it is accurate and the PUSURA tic lens of a concave configuration can be produced quickly, and its shaping metal mold in this invention.
[0012]
[Means for Solving the Problem] This invention solved the above-mentioned technical problem as follows. That is, after filling up with and compressing an ingredient into the metal mold for injection compression molding and fabricating the lens of a concave configuration, a contracted part by the thickness difference of the core of this lens and a periphery is amended by supplying an ingredient to the periphery of mold goods. The die temperature at the time of ingredient restoration is made below into glass transition temperature.
[0013]
[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing based on an example.
[0014] In this invention, in order are accurate at injection molding and to fabricate the lens of a concave configuration quickly, the die temperature at the time of restoration is made below into the glass transition point temperature (the range of glass transition point temperature to -20-degree C glass transition point temperature) of an ingredient, and compaction of solidification time amount is aimed at after restoration as temperature to which an ingredient starts solidification for a die temperature. Thus, it may be in the condition which shows a die temperature in drawing 7 (b) from the condition shown in drawing 7 (a) as the term of a Prior art described the flow in the cavity of an ingredient as for below glass transition point temperature, and a short shot 25 may occur in a weld line 24 and a core in the opposite side of the gate 21. Therefore, in this invention, shaping metal mold is considered as the following configurations.
[0015] Drawing 1 is the sectional view showing the shaping metal mold of the concave lens by this invention. In addition, a part the same as that of the conventional example or equivalent is explained using the same sign.
[0016] The fixed bottom place 2 by which shaping metal mold is attached in stationary platen 1 as shown in this drawing, The KYABI plate 3 which is attached in this fixed bottom place 2, and has two or more crevices on a front face, The movable bottom plate 6 attached in the movable head 4 through the heat insulation plate 5 etc., The core plate 7 whose attachment and detachment is enabled at annular section 6a currently formed in this movable bottom plate 6, Attachment and detachment on this core plate 7 is enabled, and it consists of a runner plate 9 which forms a parting surface 8 with said KYABI plate 3, and an ejector plate 10 prepared possible [longitudinal slide movement] in annular section 6a of said movable bottom plate 6.
[0017] Two or more core 7a which has heights is formed at the tip at the runner plate 9 side of said core plate 7. This core 7a is inserted in two or more through tubes formed in the shaft orientations of the runner plate 9 possible [longitudinal slide movement], and the heights at a tip engage with the crevice of said KYABI plate 3, and form a cavity 11 between them. In addition, the crevice which forms two or more tab 16b is formed in the front face of the runner plate 9 at the periphery 16a and periphery side of mold goods 16.
[0018] Two or more push rods 12 are attached in shaft orientations at the movable bottom plate 6 side of said core plate 7. This push rod 12 is inserted in two or more through tubes formed in the ejector plate 10 and the movable bottom plate 6 possible [longitudinal slide movement], and the press of it is enabled by the annular core push piston 13 prepared in the center section of the movable head 4 possible [longitudinal slide movement]. Moreover, the press of said ejector plate 10 is enabled with the rod 14 for ejectors prepared in the centrum of the core push piston 13 possible [longitudinal slide movement].
[0019] The ejector pin 17 which presses spool 15 and discharges mold goods 16, and two or more pins 18 which press periphery 16a of mold goods 16 are attached in the core plate 7 side of said ejector plate 10. Said ejector pin 17 and pin 18 are inserted in the through tube formed in the shaft orientations of the core plate 7 and the runner plate 9 possible [longitudinal slide movement].
[0020] Between said core plates 7 and ejector plates 10, the spring 19 for ejector plate return is formed, and the spring 20 for core plate return is formed between the runner plate 9 and the core plate 7.
[0021] Next, actuation of the above-mentioned shaping metal mold is explained with reference to drawing 1 - drawing 3 .
[0022] Drawing 1 shows the condition that specified quantity restoration of the ingredient is carried out into the cavity from the gate 21. Drawing 2 is an explanatory view in which an ingredient shows the condition that specified quantity restoration of [in a cavity] was carried out, (a) is a front view and (b) is a side elevation.

Drawing 3 is drawing showing the condition that the ingredient in a cavity was compressed, (a) is a front view and (b) is a side elevation.

[0023] First, as shown in drawing 1 and drawing 2 , where core 7a and a pin 18 are returned back, specified quantity restoration of the ingredient is carried out into a cavity 11 from the gate 21.

[0024] Next, as shown in drawing 3 , core 7a is advanced at the core push piston 13, an excessive ingredient is made to flow into tab 16b, or it is made to flow backwards to the gate 21, and size enlargement of the mold-goods configuration is carried out. Next, only a distance predetermined with the rod 14 for ejectors advances a pin 18 and the ejector pin 17, and contraction of the ingredient of periphery 16a of mold goods 16 is amended.

[0025] Next, a movable head 4 is retreated, metal mold is divided in a parting surface 8, the ejector plate 10 is advanced with the rod 14 for ejectors, and mold goods 16 are dropped. Although [the above-mentioned example] a pin 18 performs compression of periphery 16a of mold goods 16, as shown in drawing 4 , you may carry out with a sleeve 22 etc. Moreover, to be shown in drawing 5 , pin 18a may be prepared in tab 16b, and periphery 16a may be compressed. Moreover, although the injection compression method is made into the core compression method, it is good also as a whole surface push compression method.

[0026]

[Effect of the Invention] This invention does so effectiveness which is indicated below.

(a) Since the die temperature at the time of restoration is made into glass transition temperature, productivity improves.

(b) Since supply of the ingredient to a periphery has amended a contracted part by the thickness difference of a core and a periphery which prevents generating of the short shot of a core and is generated by injection compression (core compression method etc.) in that case, it can obtain the lens of the concave configuration where precision is high.

(c) The thickness difference of a core and a periphery can fabricate the lens of the large concave configuration of 3 times or more with a sufficient precision.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing the shaping metal mold of the concave lens by this invention.
[Drawing 2] An ingredient is the explanatory view showing the condition of having filled up in the cavity, (a) is a front view and (b) is a side elevation.
[Drawing 3] It is drawing showing the condition that the ingredient in a cavity was compressed, and (a) is a front view and (b) is a side elevation.
[Drawing 4] It is drawing showing the configuration which compresses the periphery of mold goods with a sleeve.
[Drawing 5] It is drawing showing the configuration which compresses the periphery of mold goods by the pin prepared in the tab.
[Drawing 6] It is the sectional view of a concave lens.
[Drawing 7] In case injection molding of the concave lens is carried out, it is drawing showing the flow of the ingredient injected in the cavity. (a) is drawing in which (b) shows the condition at the time of the completion of restoration at the time of restoration.
[Drawing 8] It is the block diagram of the injection-compression-molding metal mold by the conventional core compression method.
[Description of Notations]
1 Stationary Platen
2 Fixed Bottom Place
3 KYABI Plate
4 Movable Head
5 Heat Insulation Plate
6 Movable Bottom Plate
6a Annular section
7 Core Plate
7a Core
8 Parting Surface
9 Runner Plate
10 Ejector Plate
11 Cavity
12 Push Rod
13 Core Push Piston
14 Rod for Ejectors
15 Spool
16 Mold Goods
16a Periphery
16b Tab
17 Ejector Pin
18 18a Pin
19 20 Spring
21 Gate
22 Sleeve

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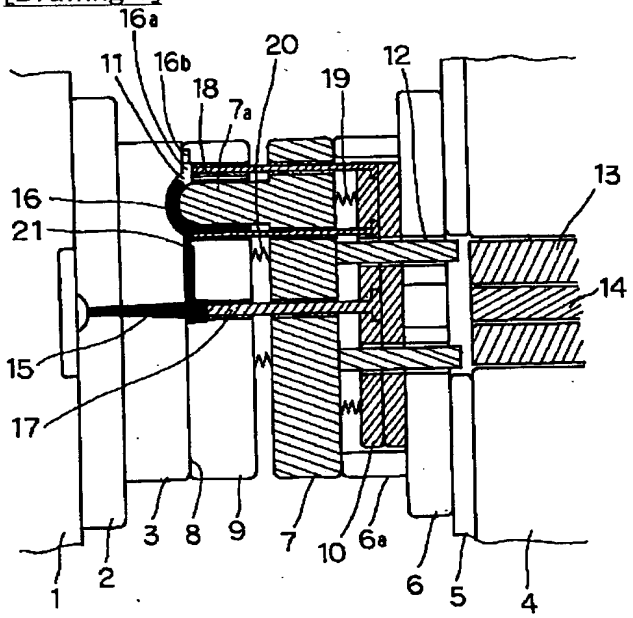
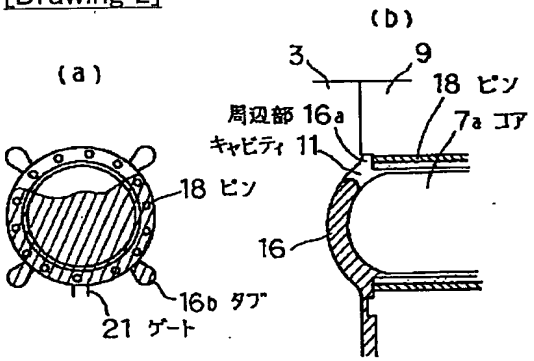
* NOTICES *

DRAWINGS

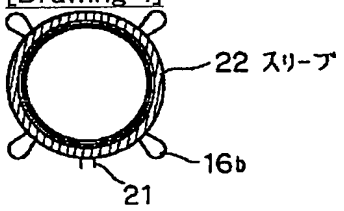
[Drawing 1]



[Drawing 2]



[Drawing 4]



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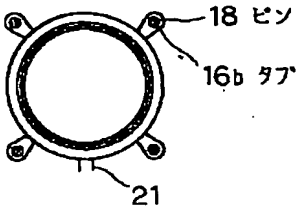

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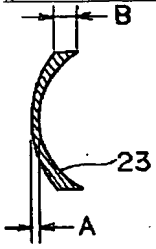
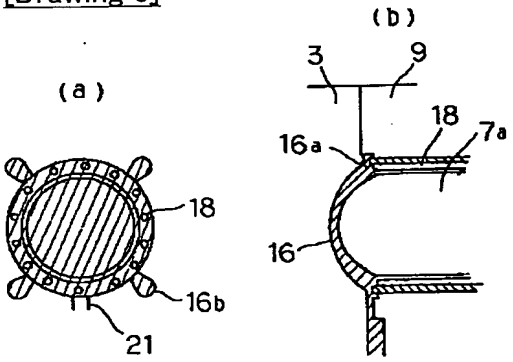


[Drawing 3]



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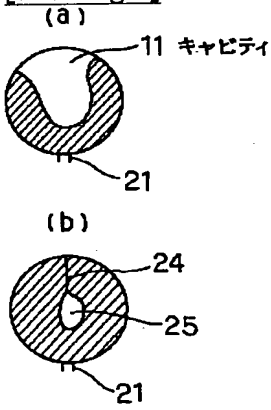
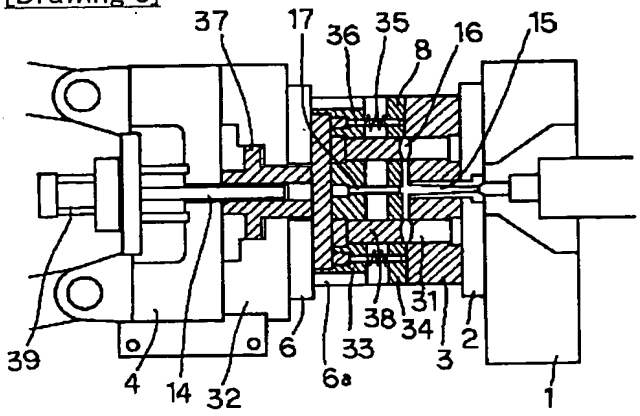


[Drawing 8]



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